BS EN IEC 62576:2018

BSI Standards Publication

Electric double-layer capacitors for use in hybrid electric vehicles - Test methods for electrical characteristics

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National foreword

This British Standard is the UK implementation of EN IEC 62576:2018. It is identical to IEC 62576:2018. It supersedes BS EN 62576:2010, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee PEL/69, Electric vehicles.

A list of organizations represented on this committee can be obtained on request to its secretary.

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN IEC 62576

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ICS 31.060.99; 43.120

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English Version

Electric double-layer capacitors for use in hybrid electric vehicles - Test methods for electrical characteristics (IEC 62576:2018)

Condensateurs électriques à double couche pour véhicules électriques hybrides - Méthodes d'essai des caractéristiques électriques (IEC 62576:2018)

Elektrische Doppelschichtkondensatoren für die Verwendung in Hybridelektrofahrzeugen - Prüfverfahren für die elektrischen Kennwerte (IEC 62576:2018)

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European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

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European foreword

The text of document 69/486/CDV, future edition 2 of IEC 62576, prepared by IEC/TC 69 "Electric road vehicles and electric industrial trucks" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 62576:2018.

The following dates are fixed:

• latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2018-12-27
• latest date by which the national standards conflicting with the document have to be withdrawn	(dow)	2021-03-27

This document supersedes EN 62576:2010.

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The text of the International Standard IEC 62576:2018 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

IEC 61881-3:2012	NOTE	Harmonized as EN 61881-3:2012 (not modified).
IEC 61881-3:2012/A1:2013	NOTE	Harmonized as EN 61881-3:2012/A1:2013 (not modified).
IEC 62391 Series	NOTE	Harmonized as EN 62391 Series.

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

ELECTRIC DOUBLE-LAYER CAPACITORS FOR USE IN HYBRID ELECTRIC VEHICLES – TEST METHODS FOR ELECTRICAL CHARACTERISTICS

FOREWORD

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International Standard IEC 62576 has been prepared by IEC technical committee 69: Electric road vehicles and electric industrial trucks.

This second edition cancels and replaces the first edition published in 2009. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

a) information on applicability of this document has been added in Clause 1;
b) the definitions of some terms in Clause 3 have been improved;
c) the description of test procedures in Clause 4 has been clarified;
d) information on endurance cycling test has been added (Annex E).

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The text of this International Standard is based on the following documents:

CDV	Report on voting
69/486/CDV	69/539/RVC

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

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INTRODUCTION

The electric double-layer capacitor (capacitor) is used as an energy storage system for vehicles. Capacitor-installed electric vehicles are commercialized with an eye to improving fuel economy by recovering regenerative energy, and by peak power assistance during acceleration, etc. Although standards for capacitors already exists (IEC 62391 series), those for electric vehicles involve patterns of use, usage environment, and values of current that are quite different from those assumed in the existing standards. Standard evaluation and test methods will be useful for both auto manufacturers and capacitor suppliers to speed up the development and lower the costs of such capacitors. With these points in mind, this document aims to provide basic and minimum specifications in terms of the methods for testing electrical characteristics, and to create an environment that supports the expanding market of electric vehicles and large capacity capacitors. Additional practical test items to be standardized should be reconsidered after technology and market stabilization of capacitors for electric vehicles. Regarding endurance, which is important in practical use, just a basic concept is set forth in the informative annexes.

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ELECTRIC DOUBLE-LAYER CAPACITORS FOR USE IN HYBRID ELECTRIC VEHICLES – TEST METHODS FOR ELECTRICAL CHARACTERISTICS

1 Scope

This document describes the methods for testing electrical characteristics of electric double-layer capacitor cells (hereinafter referred to as "capacitor") used for peak power assistance in hybrid electric vehicles.

All the tests in this document are type tests.

This document can also be applicable to the capacitor used in idling reduction systems (start and-stop systems) for the vehicles.

This document can also be applicable to the capacitor modules consisting of more than one cell.

NOTE Annex E provides information on endurance cycling test.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

3.1
ambient temperature
temperature of the air, in the immediate vicinity of a capacitor

3.2
applied voltage
voltage (V) applied between the terminals of a capacitor

3.3
calculation end voltage
voltage (V) at a selected end point for calculating the characteristics including capacitance under a state of voltage decrease during discharge

3.4
calculation start voltage
voltage (V) at a selected start point for calculating the characteristics including capacitance under a state of voltage decrease during discharge

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3.5
capacitance
ability of a capacitor to store electrical charge (F)

3.6
charge accumulated electrical energy
amount of charged energy (J) accumulated from the beginning to the end of charging

3.7
charge current
I_c
current (A) required to charge a capacitor

3.8
charging efficiency
efficiency under specified charging conditions, and ratio (%) of stored energy to charge accumulated electrical energy

Note 1 to entry: This value is calculated from the internal resistance of a capacitor.

Note 2 to entry: Refer to Formula C.8.

3.9
constant voltage charging
charging during which the voltage is maintained at a constant value regardless of charge current or temperature

3.10
discharge accumulated electrical energy
amount of discharged energy (J) accumulated from the beginning to the end of discharging

3.11
discharge current
I_d
current (A) required to discharge a capacitor

3.12
discharging efficiency
efficiency under specified discharging conditions, and ratio (%) of discharge accumulated electrical energy to stored energy

Note 1 to entry: This value is calculated from the internal resistance of a capacitor.

Note 2 to entry: Refer to Formula C.10.

3.13
electric double-layer capacitor
capacitor
device that stores electrical energy using a double layer in an electrochemical cell, and whose positive and negative electrodes are of the same material

Note 1 to entry: The electrolytic capacitor is not included in capacitor of this document.

3.14
energy efficiency
E_f
ratio (%) of discharge accumulated electrical energy to charge accumulated electrical energy under specified charging and discharging conditions

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